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College of Engineering

**TOWARD ENHANCING ESTIMATES OF KENTUCKY'S
HEAVY TRUCK TAX LIABILITIES**





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**Research Report
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**Toward Enhancing Estimates of Kentucky's
Heavy Truck Tax Liabilities**

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Executive Summary

Kentucky has established a Road Fund tax structure that is partially based on the principle that the system users pay their fair share of the costs associated with maintaining a safe and efficient highway system in Kentucky. Several of the most important sources of Kentucky's road fund revenues derived from commercial trucking are dependent on the self-reported tax liabilities submitted by trucking firms. Self-reporting and the interstate nature of this industry allows for the possibility of tax evasion either due to fraudulent behavior or processing errors. To ensure the integrity of the system, the Revenue and Transportation Cabinets have an ongoing audit system. The effectiveness of the audit process depends, to some degree, on estimates of overall tax liabilities. These estimates allow the auditors to focus their efforts and resources at areas perceived to require attention, allowing for an efficient administration of tax enforcement. In the case of motor carriers, effective estimation tools are required in order for tax administrators and auditors to know how many tax dollars are owed to the state from commercial trucking taxes. Only with effective estimation models can evasion be observed and effectively combated.

The focus of this report is the effectiveness and reliability of the current models employed to calculate the weight-distance tax and fuel surtax liabilities. As currently constituted, these models suggest that there may be a significant difference between estimated tax liabilities and revenues actually collected from these taxes. This report examines the current methodology utilized to estimate potential tax liabilities to determine if such estimates may be enhanced and verified. It also raises some questions regarding the sampling methods utilized in the models that determine the frequency distribution of heavy carrier registered weights on Kentucky's roadways. The critique concludes that the current methodology has limitations, which may lead to less than reliable results and, as a consequence, total commercial truck tax liability estimates may be either overstated or understated.

Also, this report was tasked with exploring the possibility of using other data as a means of developing alternative models to calculate the aforementioned tax liabilities. The interested parties were especially intrigued by the possibility of utilizing data from the International Fuel Tax Agreement (IFTA) and the Kentucky Intrastate Tax (KIT) reports to estimate the weight-distance tax liability. This report suggests that it is unlikely that these reporting mechanisms will provide the necessary data to provide the foundation for an effective estimation tool.

Furthermore, during the course of this report's investigation, the authors were made aware of the Automatic Traffic Recorder (ATR) system. This system is used by the KYTC Division of Planning to capture axle-configuration and weight data of vehicles on Kentucky highways. It was suggested by the administrators of this system and other related experts within the KYTC that—given reasonable assumptions—this system could provide a robust frequency distribution of vehicle registered weights on Kentucky's roadways.

As a result, this report recommends that the Kentucky Transportation Center and the appropriate staff from the KYTC determine the validity of the ATR data as an alternative means of calculating a distribution of registered weights. If that data proves to be a valid source for determining the relevant proportions, this report recommends using those new proportions as a revision within the current model to calculate the weight-distance tax and heavy vehicle surtax liabilities.

The revised model could be used alongside the current model with each serving as a “check” on the other model’s results. If they produce similar results, then the estimates should be received with a high level of confidence. If they produce different results, then the interested parties should embark upon additional study to determine the validity of each and attempt to reconcile their results.

Additionally, an alternative model is proposed as an additional “check” on weight-distance calculations. However, significant questions are also raised surrounding the methodology of this proposal and, therefore, it is suggested that the results of this model be accepted with skepticism.

Finally, additional areas that should be targeted for further research are proposed.

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Chapter 1

Truck Associated Taxes: An Introduction and Overview

The state of Kentucky expended over \$1,650,760,000 for transportation and highway related disbursements from federal and state sources in FY 2000¹. State revenues for purposes such as road maintenance, construction, debt retirement on transportation projects, and administrative costs for such purposes are set-aside in a special fund call the Kentucky Road Fund. Only transportation and highway related revenues are devoted to this fund. These revenue sources include usage taxes, fuel taxes, and registration fees among others. Kentucky's Road Fund tax structure is partially based on the tax principle that system users should pay their fair share of the costs associated with maintaining a safe and efficient highway system in Kentucky.

Chapter One of this study reviews the taxes relevant to commercial trucking. As we will discuss later in this report, several of the most important sources of Kentucky's Road Fund revenues derived from commercial trucking are dependent on the self-reported tax liabilities submitted by trucking firms. Self-reporting of taxes and the interstate nature of this industry allows for the possibility of tax evasion either due to fraudulent behavior or mistakes. Therefore, effective tax liability estimation tools are useful for tax administrators to know how many tax dollars are owed to the state from commercial trucking taxes. With such estimates, administrators can more effectively manage and target high probability evasion areas or groups. The purpose of this study is, then, to examine the current commercial carrier tax liability estimation models utilized by Kentucky, to evaluate their effectiveness, and to make recommendations for possible improvements in estimation techniques.

A Primer on Truck Taxes:

One only has to drive on virtually any road in this country to witness the prominence and importance of the trucking industries. Tractor trailers, semis, eighteen-wheelers, or more simply trucks, of all sizes carry raw materials to our factory doors and deliver the finished goods to our stores for purchase. Our personal lives and jobs are dependent upon trucking; however, trucks take a tremendous toll upon the roads we drive. The size and the volume of these vehicles generate substantial wear and tear on the road system. The increasing volume of traffic upon our roads and new development creates the need for the construction of new roads and the maintenance of existing highways. In order to finance the costs of highway maintenance and construction, our states levy taxes and fees upon all types of vehicles that use our road system. Each state's tax system is unique concerning the mix of taxes it administers and the rates of its taxes. However, there are a few taxes that all states have been imposed on the trucking industry.

¹Federal Highway Administration. *Highway Statistics Series 2000*. www.fhwa.dot.gov/ohim/hs00/sf2.htm

Diesel Fuel Tax

The vast majority of commercial trucks are fueled by diesel fuel. Each gallon of diesel fuel is taxed by the federal government, by the state government in which it was purchased, and in some areas even the locality of purchase applies a small tax. The federal government applied a \$0.244 per gallon tax to diesel fuel in 1998. Each state's diesel fuel tax rate varied in the year 2000 from \$0.08 per gallon in Alaska to \$0.308 per gallon in Pennsylvania. The national average of state tax rates on diesel fuel for that year was \$0.2037 per gallon.² Gasoline and diesel fuel tax revenues are a vital source of funds for state governments. Fuel tax receipts are the second largest source of highway and transportation related revenues in the Commonwealth of Kentucky only behind receipts of fees (including the usage tax). Kentucky levies a basic \$0.12 tax on each gallon of diesel fuel purchased within its borders along with a supplemental surtax for heavy commercial carriers. Diesel fuel tax revenues comprise slightly over 20% of all fuel tax revenues with gasoline tax revenues accounting for the other 80%.³ A fairly elaborate international cooperation system exists to ensure each state, or Canadian Province, receives its correct amount of diesel fuel tax revenues. The interstate nature of trucking historically presented many difficulties in accurately dispersing fuel tax revenues, but the International Fuel Tax Agreement (IFTA) provided an effective method to ensure each state received the funds it was due from trucks that passed over its borders. The details of this landmark agreement will be explored further later in this report.

Registration Fees

States register commercial trucks in a myriad of ways. Some states register the truck and its trailer as a single unit, others register the truck based on its axles or wheels, still others register the truck by weight, just to name a few. It can be difficult to ascertain which state is owed registration funds for interstate commerce vehicles. To alleviate this confusion, the International Registration Plan (IRP) was established. It is a registration reciprocity agreement among states to collect and disburse registration and license fee revenues based on fleet miles driven in participating member states. For commercial vehicles registered in Kentucky as both intrastate and interstate vehicles, the fee receipts from these registrations created \$54.8 million in revenues for FY2000.⁴ This represents only about 4% of our total fee income. Kentucky's registration rates for a commercial truck (over 6,000 pounds) are based on the weight of the vehicle. The registration fee schedule for commercial vehicles registered in Kentucky is shown in the following table:

² All fuel tax rates obtained from *Highway Statistics 2000*. www.fhwa.dot.gov/ohim/hs00

³ Eger, Robert J, and Hackbart, Merl. KTC Technical Study: State Road Fund Revenue Collection Processes: Differences and Opportunities of Improved Efficiency. Research Report: KTC-01-17/SPR-99-192-1F. July 2001

⁴ Kentucky Revenue Cabinet and Governors Office for Economic Analysis, Office of State Budget Director, Kentucky Quarterly Economic & Revenue Report, July, 2000.

Table 1: Registration Fee Schedule for Vehicles Registered in Kentucky⁵

Declared Gross Weight	Registration Fee
6,001 – 10,000	\$ 24
10,001 - 14,000	\$ 30
14,001 – 18,000	\$ 50
18,001 – 22,000	\$ 132
22,001 – 26,000	\$ 160
26,001 – 32,000	\$ 216
32,001 – 38,000	\$ 300
28,001 – 44,000	\$ 474
44,001 – 55,000	\$ 544
55,001 – 62,000	\$ 882
62,001 – 73,280	\$1,125
73,281 – 80,000	\$1,260

Taxes Unique to Kentucky:

As indicated, all states participate in the International Fuel Tax Agreement to collect and disburse the appropriate levels of diesel fuel tax revenues produced by commercial trucks. Similarly, all states collect registration fees from commercial truck owners and most participate in the International Registration Plan. Additionally, each state requires commercial truckers to maintain a current commercial driver’s license. Typically a small amount of revenue derived from licensing is devoted to highway and transportation related funds. However, there are some taxes related to the trucking industry that are unique to Kentucky. There are three main taxes that Kentucky levies upon commercial trucks that are not common to other states. These include the diesel fuel surtax, the weight-distance tax, and the Kentucky Usage Tax.

- The ***Diesel Fuel Surtax*** – a \$0.052 surtax applied to each gallon of diesel fuel sold that must be paid in addition to the 12-cent flat tax. Applied only to trucks weighing over 26,000 pounds.
- The ***Weight Distance Tax*** – a \$0.0285 tax applied to each mile traveled within the state of Kentucky by trucks weighing over 59,999 pounds.
- The ***Kentucky Usage Tax*** – a 6% tax on the purchase price of all new and used vehicles sold in Kentucky.

⁵ Source: KRS186.047 (3)

The Diesel Fuel Surtax

It was discussed previously that Kentucky taxes each gallon of diesel fuel purchased by \$0.12 at the pump. Every car or truck that is fueled by diesel pays this flat \$0.12 tax at the pump regardless of size. However, Kentucky legislated a system to assign more of a cost to larger trucks because of the exaggerated wear they produce upon our state's roadways. In order to do this, a diesel fuel surtax was created that applies an additional \$0.052 per gallon purchased for use in trucks weighing over 26,000 pounds. This weight restriction exempts pick-up trucks and very light commercial trucks.

The surtax is not collected at the pump but rather collected post purchase on a quarterly basis. For trucks that routinely transport goods across state borders, the drivers must record the gallons of fuel purchased in Kentucky and the miles traveled within Kentucky. The amount owed due to the surtax is calculated from the record of gallons purchased in the state and remitted along with these records by the truck owners. This process collects all funds owed by interstate carriers, but another method is needed to collect the surtax owed by trucks that only travel in the state of Kentucky. The Kentucky Intrastate Reporting (KIT) system facilitates the collection of the surtax on diesel fuel purchased by intrastate trucks. KIT returns require the recording of diesel gallons purchased and must be filled out and returned quarterly, along with the monies owed to the state from the surtax. The details of the surtax administration and collection via IFTA and KIT will be discussed in greater detail later in this report.

The Weight Distance Tax

As its name suggests, the weight distance tax is structured so that each mile traveled by heavy trucks within the state is taxed. Only Kentucky, New Mexico, New York, and Oregon collect a weight distance tax (or ton-mile tax as it is called in other states). The tax is required of trucks weighing over 59,999 pounds that are either interstate or intrastate carriers. Its purpose is to collect funds from the owners of very large trucks that place considerable wear and tear on the roads to ensure they pay their fair share of maintenance costs. A tax of \$0.0285 is applied to each mile traveled in Kentucky by a truck weighing over 59,999 pounds. The weight distance tax produced approximately \$75 million in revenues for the year 2000.⁶

Another reporting system is used to calculate the amount of money a truck owner owes due to the weight distance tax. Truckers record their total miles traveled in Kentucky and file a Kentucky Use (KYU) report quarterly. Any truck that plans to travel within Kentucky's borders must file a request to obtain a KYU permit. At all truck weigh stations; the truck's KYU permit number is checked for validity and outstanding dues or penalties. Recently, federal DOT numbers have also been utilized to check for the aforementioned information. Upon checking the truck at the weigh station, information such as truck size, date, and time are automatically entered into a computerized database called the Automated Licensing and Taxation System. This

⁶ Kentucky Transportation Cabinet

database can be checked against self-reported data from the KYU reports to seek out evasion and fraudulent reporting that might require an investigation by audit.

Kentucky Usage Tax

Every tangible good purchased in Kentucky, except for goods deemed exempt by the legislature, is subject to a six percent (6%) sales tax on the final total of purchase price. Passenger cars, trucks, and commercial vehicles purchased within the state are also subject to a six- percent usage tax rate when purchased. This tax is similar to a sales tax because it is a flat percentage rate tax applied to the total purchase price, but it is not actually part of the general sales tax of the state. This tax on vehicles purchased is called the Kentucky Usage Tax. Instead of being collected by the retailer as with other goods, the Kentucky Usage Tax is typically paid by the buyer upon registration of the vehicle.

Forty-one percent (41%) of all highway / transportation related revenues for the state are derived from this source from all types of vehicles. This source of revenue for the state's Road Fund has been steadily increasing over the past decade. This is due to the ever-rising cost of vehicles and the increasing number of vehicles purchased. Future revenues from this tax source are dependent on the number of vehicles sold and the prices of vehicles in the future.

The usage tax is applied to the retail purchase of commercial trucks as well as private vehicles, whether the trucks are used for interstate or intrastate commerce. Only trucks registered within Kentucky are subject to the usage tax. Usage tax receipts on trucks weighing over 55,000 were over \$8 million dollars in FY 2000.⁷ All states that share a border with Kentucky offer broad exemptions on sales or usage taxes on commercial trucks over 55,000 pounds. This puts Kentucky at a competitive disadvantage when compared to surrounding states.

The Importance of Accurate Estimation Tools:

The diesel fuel tax is included in the price at the gasoline pump and prorated to the states through which the commercial vehicles travel. So, if a gallon of diesel fuel is purchased the tax is automatically paid. The registration fee and usage tax are paid in order to obtain the proper vehicle registration. However, the weight distance tax and the diesel fuel surtax are self-reported. The procedure of self-reporting opens the door tax evasion. Whether due to unintentional mistakes or fraudulent behavior, the possibility of evasion exists. The only way to calculate the existence and severity of such evasion is to have effective and accurate revenue estimation techniques and models.

It is vital to have accurate estimation models in order to check self reported data against previously completed revenue forecasts and estimations. This checking process can reveal differences in projected revenues from the surtax or the weight distance tax against real collected revenues. Substantial differences between the two figures may

⁷ Hackbart, Merl, Suzanne Perkins, and Miriam Fordham. "Transportation Finance: Kentucky's Structure and National Trends." KTC Research Report – KTC-02-11/SPR255-02-1F. May 2002.

reveal the existence of evasion. However, inaccurate estimation systems may exaggerate or diminish estimates of taxes due or possible evasion. Revenue estimation models rely on many different types of data to be accurate. The size of trucks, miles traveled or gallons used, the gas mileage of different trucks, and the volume of truck travel are all-important factors in proper estimation models. The state's current estimation technique for forecasting revenues from the diesel fuel the weight distance tax are explained in detail in Chapter Two of this report.

Possible Alternatives for Estimation

As indicated, when making revenue forecasts, forecasters often employ multiple models to improve accuracy. Forecasters realize that individual models may have inherent deficiencies due to the limitation of their statistical methodology. By employing multiple models, forecasters can compare and contrast the results from individual models.

The same principles apply to the issues considered in this report. Currently, individual models are utilized to estimate the liabilities of the weight-distance and fuel surtax liabilities. Like any model, they contain estimating limitations. As a result, developing alternative systems (or revising current ones) to estimate the aforementioned liabilities may provide a sensible "check" on the estimates. As in the case of revenue forecasting, these models may then be used in conjunction with one another to provide a robust estimate of approximated liabilities. Chapter 4 of this report will discuss possible alternative modeling efforts that may enhance the accuracy of forecasts given new and emerging data sources.

Form and Function of the Audit:

There are three steps involved in insuring that commercial truckers correctly comply with tax legislation associated with their industry. Auditing, assessment, and penalizing noncompliance are vital in assisting the state to collect the monies it is due. The most important step is the audit because audits establish the tax liability of the firm or owner in question and therefore 'pave the way' for assessment and possible penalization via fines or prosecution.

In terms of sources of Road Fund revenues in Kentucky, the authority to perform audits and issue assessments is shared among the Transportation Cabinet and the Revenue Cabinet. This authority is granted by law and set forth in the Kentucky Revised Statutes. Audits regarding the collection of the diesel fuel tax (administered via IFTA) are carried out by the Transportation Cabinet. The Revenue Cabinet has the authority to audit taxpayers in terms of the usage tax applied to the purchase of new and used vehicles. The only exception in this category is the U-Drive It Tax, which is the usage tax applied to leased and rented vehicles, the audits for the usage tax for leased and rented vehicles are performed by the Transportation Cabinet. Other revenue sources are also the responsibility of the Auditing Department of the Transportation Cabinet. The Transportation Cabinet can audit taxpayers of the diesel fuel surtax and the weight distance tax. Registration fee enforcement for vehicles is the responsibility of the

Department of Motor Vehicle Licensing. There are situations in which the Revenue Cabinet and the Transportation Cabinet work in conjunction to perform audits. Currently the Revenue Cabinet and the Transportation Cabinet can jointly audit fuel distributors for compliance with the diesel fuel tax.

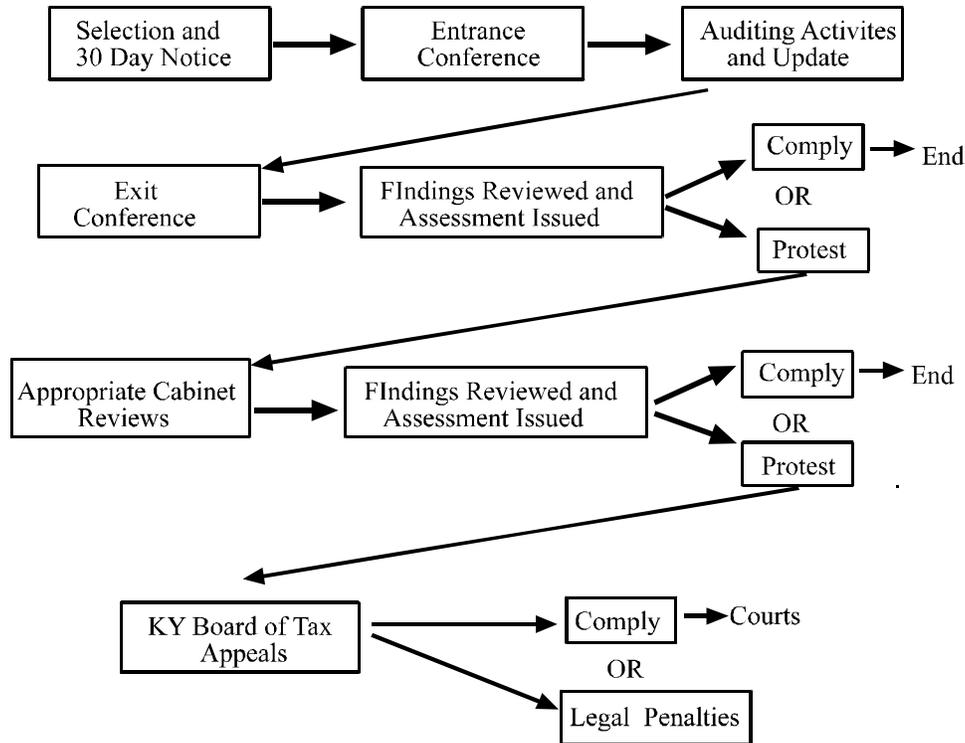
The selection of taxpayers for audit is not an entirely random selection when Road Fund revenues are in question. Rather than a random sampling, the returns submitted by taxpayers are routinely matched against records such as prior returns maintained by state government. Inconsistencies are ranked in order of relative discrepancies between the sets of records. These inconsistencies are indicators that evasion may have occurred. Other evasion indicators include drastic changes between years of self-reported gas purchases or miles traveled. The taxpayers that are chosen for audit are then placed under investigation and the Cabinet performing the audit is authorized to pull all relevant tax records and documents. The individual or business being audited is at this time sent a thirty-day letter of notice. This letter informs the person(s) being audited that they are under investigation and they should make their own personal records ready for review at a minimum of thirty days in the future.

After thirty days notice, auditors are sent to perform the field audit or review the records at their governmental office, which is referred to as a 'desk' audit. While either Cabinet can perform either type of audit, the Revenue Cabinet typically performs desk audits while the Transportation Cabinet usually executes field audits. In other words, each Cabinet specializes in a particular type of audit. During audits, the auditors conduct an entrance conference with the taxpayers in question to explain the procedure and obtain the personal records of the taxpayers. During the audit, the person(s) under audit are routinely updated on the proceedings of the audit. Upon completion of the audit, an exit conference is conducted.

The auditors then proceed to review findings and calculate an assessment of the unpaid tax liability of the taxpayer in question. Next, the assessment is issued to the party in question, who in turn either complies with the assessment or protests the assessment. Any protest is filed with the appropriate cabinet and the assessment is again reviewed. The appropriate cabinet issues a final ruling within forty-five days. Once again, the party in question has the choice to either pay the tax assessment or to protest the findings. A second protest is heard in the Kentucky Board of Tax Appeals proceeding called a Title 13-B hearing. At this point in the process, the auditors are now witnesses in the proceedings and cease their role as enforcers. A final order of the Board is issued after the hearing, and the taxpayer liable for the assessment must either pay the amount owed or face legal penalties.

Figure 1 on the following page illustrates the audit process.

Figure 1: The Audit Process



The Focus of This Study:

As indicated, the commercial trucking tax system encompasses a vast array of taxes. The revenues generated by these taxes are critical to the financing of Kentucky’s highway systems. Therefore, it is important that tax administrators understand the amount of revenues owed to the state so that effective tax administration and audit functions can be planned and executed. If discrepancies between estimated and recorded revenues exist, audit strategies can be employed to collect the monies rightfully owed to the state. However, in order to properly calculate the true amount of revenues to be generated by our taxes, tax administrators need effective estimation tools; this is especially true for self-reported taxes.

The purpose of this study is to examine the current models Kentucky uses to estimate weight distance tax and diesel fuel surtax liability and to determine if new data can improve these models. Chapter Two focuses on the current estimation procedures and modeling efforts. Special attention is given to the data that is collected for each system, and similarities or differences in the data collected for these systems are explored. Next, an analysis of the alternative data sets that may provide the foundation for alternative estimation tools is presented in Chapter Three. Finally, recommendations are proposed in Chapter Four that may shed light on ways to enhance and improve our current tax liability estimation systems.

Chapter 2

Weight Distance and Fuel Surtax--The Current Estimation Models

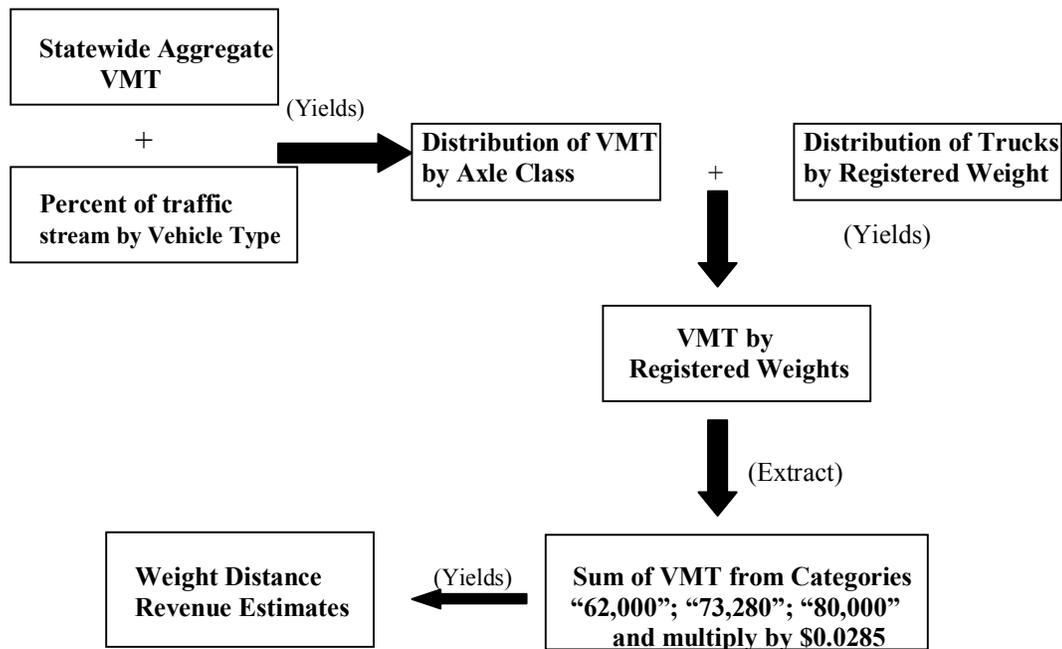
As stated in Chapter 1, the weight distance tax and the diesel fuel surtax are self-reported taxes. The procedure of self-reporting opens the door for potential tax evasion. The only way to calculate the existence and severity of possible evasion is to have effective, accurate and abstract revenue estimation techniques and models. This chapter focuses on the estimation techniques utilized by the Kentucky Transportation Center in their “cost allocation” studies to estimate liabilities from the weight distance tax and from the fuel surtax. These methods are employed by the KTC to determine whether or not carriers are paying their fair share of the costs associated with maintaining Kentucky’s highway system. These calculations may also be employed by the audit managers to determine where possible evasion exists. Modeling is an effective method of estimating what tax liabilities *should be*. These methods are especially critical when they are utilized to estimate liabilities from taxes that are self-reported, which opens the door for potential evasion.

After presenting an explanation of the mechanics of the models, a critique of the methodology will be offered along with some comparative data to highlight the critical examination of the models.

Estimating Weight-Distance Tax Revenues: The Current Model

A flow diagram of the model used by the KTC to estimate weight distance taxes is shown in Figure 2:

Figure 2: Estimating Weight-Distance Revenues



Source: Kentucky Transportation Center

Vehicle Miles Traveled (VMT) are calculated by multiplying the section length of a particular sample section of roadway by the annual average daily traffic (AADT) volume. That calculated total is then multiplied by 365 (days) to estimate yearly activity. In most reports, that number is then divided by 1000 for the sake of simplification. In short:

$$\text{VMT} = (\text{Section Length} * \text{AADT} * 365) / 1000$$

The source for the count data is maintained in a traffic count file. The data is uploaded monthly to a Highway Information System (HIS) file. The data collection methods of the HIS file are sanctioned by and in compliance with guidelines established by the Federal Highway Administration (FHWA). The Highway Performance Monitoring System (HPMS) provides a sampling extract of the data included in the HIS file. The FHWA requires that states maintain the HPMS and, therefore, it also administered according to FHWA regulations.

Next, a frequency distribution of the traffic stream by vehicle type is calculated. The source of these data are Vehicle Classification Files and the HIS file, both provided by the Division of Planning, KYTC. The data set is categorically arranged by functional class of road, a rural or urban designation, the number of lanes, and finally by vehicle type—motorcycle, cars, buses, and trucks (which are then further divided into sub-categories dependent upon their axle/tire configuration).

A distribution of VMT by vehicle type is then calculated by combining the calculated VMT and the frequency distribution of vehicle types on Kentucky roads. That is, VMT are assigned to each vehicle type with truck data being sub-divided by the axle/tire configuration.

Next, a distribution of trucks by axle type in various registered weight categories is calculated. Each classification of truck by axle configuration is distributed by its registered weight ranging from 6,000 to 80,000 pounds. The sampling method is based upon Kentucky-licensed truck accident data. The type of truck, number of axles, and license number are obtained from accident reports supplied by the Department of State Police. License numbers provide the registered weights.

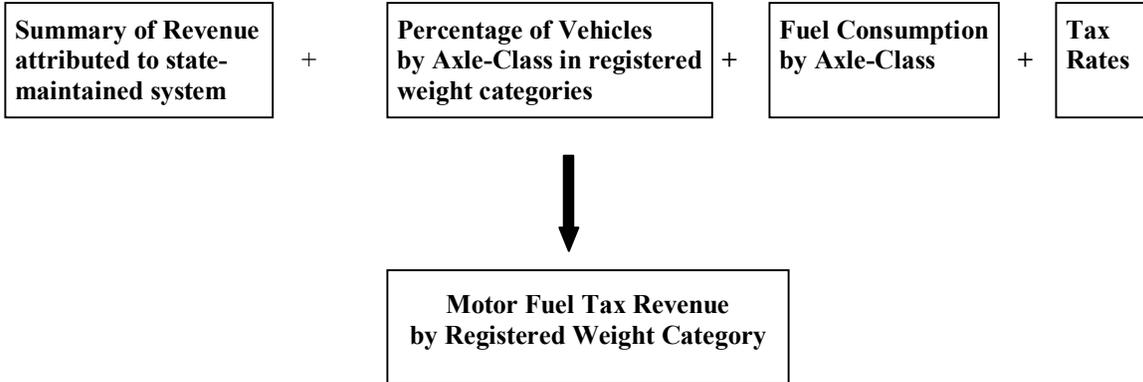
Then, by combining the data regarding the distribution of VMT by vehicle type and the distribution of trucks by registered weight, a distribution of VMT by registered weight is generated. The distribution of VMT falls under the following categories: motorcycles, cars, buses, and truck registered weight class (in pounds). The truck registered weight class consist of the following sub-divisions: 6,000; 10,000; 14,000; 18,000; 22,000; 26,000; 32,000; 38,000; 44,000; 55,000; 59,999; 62,000; 73,280; and 80,000. The sum total of VMT that qualify for the weight-distance tax is the sum of the VMT from the “62,000”, “73,280” and “80,000” columns.

Finally, after computing the taxable VMT on Kentucky roads, that sum is multiplied by \$0.0285 to establish the estimated revenues from the weight-distance tax.

Estimating the Diesel Fuel Surtax: The Current Model

The process used by the KTC to estimate the diesel fuel surtax is shown in Figure 3:

Figure 3: Estimating the Heavy Vehicle Surtax Revenue



Source: Kentucky Transportation Center

The revenue attributed to the state-maintained system is determined by utilizing data from the Transportation Cabinet’s “Financial Report to Management and Supplemental Schedules” and the Federal Highway Administration’s Highway statistics.

Next, a distribution of trucks by axle type in various registered weight categories is calculated. Each classification of truck by axle configuration is distributed by its registered weight ranging from 6,000 to 80,000 pounds. The sampling method is based upon Kentucky-licensed truck accident data. The type of truck, number of axles, and license number are obtained from accident reports supplied by the Department of State Police. License numbers provide the registered weights.

Then, fuel consumption by vehicle type is determined by utilizing Highway Statistics for fuel consumption rates, the Motor Vehicle Manufacturer’s Association for percentage of diesel powered cars, KYTC Division of Planning for consumption totals for all fuel classes and Department of Pupil Transportation for percentage of diesel powered school buses.

Finally, legislative rates for the various fuel taxes are included. As a result, a distribution of tax revenue by registered weight categories is calculated. The fuel surtax—as reported in chapter one—applies to all those vehicles (trucks) weighing over 26,000 pounds.

Critique of the Models and Methodology

While the current models used to project expected revenues from the weight-distance tax and fuel surtax are complex formulations that calculate a number of variables which build upon one another for a final tabulation, complexity in and of itself is not a viable criticism. As long as the initial, intermediate, and final steps in the process are

statistically sound—providing verifiable and reliable data—the final projections should be received with a relatively high level of confidence. If, however, there are apparent flaws or even questionable assumptions, then legitimate skepticism of the methodology and its results may develop. One assumption does raise some concern.

The method for calculating the distribution of trucks by weight categories was first introduced in the 1990 *Cost Allocation Study*. According to that study, “the need for such distributions arises from the fact that on-the-road traffic monitoring typically identifies trucks by axle configuration while tax rates...are based in part on registered or declared gross weight.”⁸ As a result:

Possibly the greatest change in 1990 was the development of new distributions representing the frequencies with which trucks of a given axle configuration are registered at given levels of gross weight...Accident reports for trucks identify the axle configuration along with its vehicle identification number and license plate number. For trucks having Kentucky plates, the VIN and license plate number (were) cross-referenced through Kentucky’s *Automated Vehicle Information System* computer file with the registered gross weight. Thus, by examining an appropriately large number of truck accidents, frequency distributions of registered weight (were) developed.⁹

Efforts over the years to attain registered weight data from other states to provide a cross-reference with out-of-state accident data has met with mixed results. Some states are more cooperative than others. Therefore, the selected samples upon which the distributions are built rely exclusively upon in-state carriers traveling on Kentucky roadways.

This sampling method was addressed in the 1992 *Review of Highway Cost Methodologies*. Comparative sampling utilizing three data sets revealed that there were “significant differences” among the frequency distributions for most of the axle categories of trucks. The report concluded that “the true frequency distributions of weight remain elusive quantities.”¹⁰

In the 2000 *Highway Cost Allocation Study Update* the questions surrounding this sampling method continued to be recognized. The report states, “one of the most difficult aspects of the cost allocation process is to reconcile the gross-weight classification of trucks” while also submitting that “past studies have concluded that a sample of Kentucky trucks involved in reportable traffic crashes provides a reasonable basis for developing the necessary registered-weight distributions as a function of axle configuration.”¹¹

⁸ Pigman, Jerry and Deacon, John. *Allocation of Highway Costs and Revenues*, Kentucky Transportation Center, College of Engineering, University of Kentucky. January 1990. p. 5.

⁹ Ibid. p. 6, 7.

¹⁰ Deacon, John; Pigman, Jerry; and Stamatiadis, Nikiforos. *Review of Highway Cost Allocation Methodologies*. Kentucky Transportation Center, College of Engineering, University of Kentucky. June 1992. p. 23, 24.

¹¹ Osborne, Monica; Pigman, Jerry; and Thompson, Eric. *2000 Highway Cost Allocation Update*. Kentucky Transportation Center, College of Engineering, University of Kentucky. March 2000. p. 5.

Utilizing crash data from 1994-98, the study estimated that “heavy truck” travel—those trucks qualifying to pay the weight-distance tax—accounted for 6.5% (6.52%) of the statewide VMT. From that conclusion, the weight-distance tax was estimated to generate over \$86.5 million in revenue in FY1999 of which \$70.1 million was collected—81% of the estimate. Similar inefficiencies in the collection of the weight distance tax occurred throughout the 1990s.¹²

One could consider the possibilities of potential variants in the calculated proportion and its effects upon the estimated weight-distance revenues. Utilizing the data from the 2000 CAS consider:

Table 2: Potential Impacts of Variance in the Proportion of Heavy Trucks on Ky. Roads

Vehicle miles of Travel-Statewide (1000)	Proportion of Heavy Trucks on KY Roads	Vehicle Miles of Travel by Heavy Trucks (1000)	Estimated Revenue (\$1,000)
46,576,919	5.50%	2,561,731	73,009
46,576,919	6.00%	2,794,615	79,647
46,576,919	6.52%*	3,038,228	86,589
46,576,919	7.00%	3,260,384	92,921
46,576,919	7.50%	3,493,269	99,558

*Actual Estimated Proportion from 2000 CAS.

Source: Baseline data derived from 2000 Cost Allocation Study, Table 17.

A variation of plus/minus one percentage point impacts the revenue estimates by over \$25 million.

Additionally, the accident data and subsequent distribution of vehicle type by axle-class in registered weight categories is utilized in the *2000 Cost Allocation Study* as a tool for estimating the “Trend in Fuel Consumption”¹³ and the “Trend in Fuel-Tax Revenue”¹⁴ which includes estimated revenues, reported revenues and “percent of estimate” (collection rate) for the carrier fuel surtax.

Interestingly, when examining the “percent of estimate” of the carrier fuel surtax for FY 1991 to FY 1999 and comparing it to the “percent of estimate” of the weight distance tax from those same years, the results are similar:

Table 3: “Percent of Estimates” for Weight-Distance Tax and Carrier Surtax

	Fiscal Year	Estimated Revenue (\$1,000)	Reported Revenue* (\$1,000)	Percent of Estimate
Weight-Distance Tax	1991	86,808	59,506	68.5
	1993	96,422	67,895	70.4
	1995	70,827	57,075	80.6
	1997	77,198	63,024	81.6
	1999	86,589	70,162	81.0

¹² See “2000 Highway Cost Allocation Update”. Table 17, p. 37.

¹³ See “2000 Highway Cost Allocation Update”. Table 18, p. 38.

¹⁴ See “2000 Highway Cost Allocation Update”. Table 19, p. 39.

	Fiscal Year	Estimated Revenue (\$1,000)	Reported Revenue (\$1,000)	Percent of Estimate
Carrier (Fuel) Surtax	1991	17,861	12,435	69.6
	1993	19,136	14,808	77.4
	1995	19,350	15,008	77.6
	1997	20,987	14,439	68.8
	1999	22,753	17,687	77.7

*Includes surtax when appropriate but excludes interest and penalties.

Source: Data gleaned from 2000 Cost Allocation Study, Table 17 and Table 19.

While the calculated percentages are not identical, their similarities are too close to ignore. The common strand between the two calculations is the distribution of trucks by functional weight class which—as alluded to earlier—depends upon a sampling method that is somewhat suspect.

Chapter 3

Kentucky Carrier Registration and Tax Liability Reporting

Those carrier companies wishing to travel through or operate within the state of Kentucky must be registered. This does not imply that the carrier must be registered within the state of Kentucky but it must be an authorized carrier with a “base” registration. Any carrier that exceeds 59,999 pounds must apply for a Kentucky Usage (KYU) number whether its “base” registration is Kentucky or outside of the state. Also, there are a number of tax compliance forms that must be completed and submitted to the state. The submission of an individual form is dependent upon where a carrier is registered.

This chapter will first discuss the International Registration Plan, IFTA application procedures, KIT registration procedures and KYU registration procedures. Next, the chapter will examine the reporting forms utilized by carrier companies to report IFTA, KIT and KYU liabilities. Finally, an analysis of these reports’ potential to be employed as a reporting mechanism for weight-distance liabilities will be discussed.

Additionally, an appendix is provided at the end of this report, which includes each of the reports/applications discussed in this chapter.

Registration and Application Procedures

- ◆ **International Registration Plan (IRP):** An objective of the American Association of Motor Vehicle Administrators (AAMVA) has long been a registration reciprocity agreement that would be fair to the motor transportation industry and provide a fair share of revenue to all jurisdictions. In 1968, an AAMVA subcommittee was formed to develop a plan that would incorporate all theories of reciprocity, and attract all jurisdictions of the United States and Canada into one uniform agreement. The project was presented to the AAMVA Annual International Conference in September 1973. A resolution passed at the conference making the IRP a reality.

For motor carriers operating under the International Registration Plan (IRP), registering a fleet of inter-jurisdictional vehicles becomes a one-stop process for motor carriers, with a simple, one-step registration. Under the provisions of the IRP, motor carriers can operate on an inter-jurisdictional basis in any IRP member jurisdiction displayed on the cab card, provided they have obtained proper operating authority. Today, the 48 contiguous US States, the District of Columbia and ten Canadian provinces, Alberta, British Columbia, Manitoba, New Brunswick, Ontario, Prince Edward Island, Newfoundland and Labrador, Nova Scotia, Quebec and Saskatchewan are all members of IRP and participate in the Plan, which authorizes registration of over 2.0 million commercial vehicles. In addition, the repository continues to have an open dialogue with Mexico on entering the IRP.

The unique feature of this plan is that, even though license fees are paid to the various jurisdictions in which fleet vehicles operate, only one license plate and one cab card is issued for each fleet vehicle. A fleet vehicle is known as an apportionable vehicle and such vehicle may be operated both interjurisdictionally and intrajurisdictionally. In Kentucky, if a carrier is based in-state and travels outside of the state and requires apportioned registration, the carrier must complete section 6 of the Kentucky Combined Trucking Application. In the future, if the company wishes to add or delete a vehicle it must complete an "IRP Apportioned Registration Supplemental Application." That form requires:

- 1) Applicant Name
- 2) Applicant Address
- 3) Phone/Fax number
- 4) IRP Account Number
- 5) Federal ID Number
- 6) KYU Number
- 7) Social Security Number
- 8) US DOT Number
- 9) Other Information

When adding and/or deleting a vehicle registration, the applicant must supply:

- 1) Owner Equipment Number
- 2) Vehicle Year
- 3) Vehicle Make
- 4) Type/Axle/Seat
- 5) Model Number
- 6) Unladen Weight
- 7) Fuel Type
- 8) Gross Weight
- 9) Combined Gross Weight
- 10) Other information

◆ **IFTA Application Procedures**

Before implementation of the International Fuel Tax Agreement (IFTA) there were over 60 different taxing jurisdictions. Each jurisdiction (state) had its own separate return, audit, license, rules, and forms. If a motor carrier operated in any of these jurisdictions it had to comply with the requirements of each state, which made filing returns difficult and time-consuming.

The goal of IFTA is to simplify and standardize the reporting of fuel taxes (gasoline, diesel, propane, blended fuels, compressed natural gas, liquid petroleum, and kerosene) by interstate motor carriers. There are four advantages of IFTA:

- One set of rules and qualifying law. These rules do not override state rules.
- One set of tax forms to complete in the "base state" rather than individual reports in every state vehicles operated in.
- A single fuel tax license which authorizes a carrier's vehicles to travel in all IFTA jurisdictions.
- One comprehensive audit on behalf of all IFTA jurisdictions instead of numerous individual audits although individual states reserve the right to conduct their own audits.

As of April 1, 1997 all states (except Alaska, Hawaii, and the District of Columbia) were confirmed as members of IFTA.

Carrier companies based in the state of Kentucky that wish to conduct business out-of-state must apply for an IFTA registration. Kentucky's *Trucking Application Form* provided by the Division of Motor Carriers requires such carrier companies to complete Section 6 and Section 8 of the form to obtain an IFTA registration.

The KYTC Division of Motor Carriers provides the following information regarding IFTA registration:

Any motor carrier based in Kentucky and operating one or more qualified motor vehicles in at least one other IFTA member jurisdiction must file an IFTA license application in Kentucky. Carriers that qualify as IFTA licensees but do not wish to participate in the IFTA program, must obtain trip permits to travel through member jurisdictions, according to the regulations and fees of each member jurisdiction. However, the potential cost of trip permits could make this an undesirable option. You are also required to obtain Kentucky motor carrier decals and file quarterly Kentucky Intrastate Surtax returns.

The IFTA license application requests basic information about the carrier and/or operations. The application is included in Section 6 of the Kentucky Combined Trucking Application.

The application requires carriers to report 1) what jurisdictions it will operate and 2) the number of vehicles requiring decals. Individual vehicle identification numbers or registered weight classifications are not required for IFTA registration.

After completing the license application, a carrier must submit the application to the Division of Motor Carriers. Once the application is processed, the Division will issue proper IFTA credentials. A carrier will not be issued IFTA credentials if the carrier was previously licensed in another IFTA member jurisdiction and the carrier's license is under suspension or has been revoked by that member jurisdiction. The

Division will not issue a license if the license application submitted contains misrepresentations or misstatements.¹⁵

- ◆ **KIT Application Procedures:** Companies also apply for their KIT certification through the Kentucky Combined Trucking Application. This is accomplished by checking the “Kentucky Intrastate Tax (KIT) Tax” portion of Section 8. No additional information or additional paperwork is required for a KIT decal to be granted.
- ◆ **KYU Application Procedures:** Companies also apply for their KYU number through the Kentucky Combined Trucking Application. Along with the application, the carrier company must also submit a list of taxable vehicles through a TC 95-38 form. When listing vehicles, the TC 95-38 form requires:
 - 1) Company Unit Number
 - 2) Vehicle Identification Number/Serial Number
 - 3) Make of Vehicle
 - 4) Year
 - 5) Declared Gross Weight

Kentucky Motor Carrier Tax Reports

Companies must submit their requisite tax reports quarterly. Which reports they file will depend upon their vehicle fleets registered weights and the jurisdictions in which their vehicles travel. This section will discuss the form and function of these reports.

- ◆ **IFTA:** The IFTA tax report form—IFTA-100-MN—is due quarterly. It requires the name of the carrier company operating in Kentucky, their address and that company’s IFTA identification number. Under the heading *IFTA Quarterly Fuel Use Tax Report* the company is then required to report its total fuel-use liabilities (or credits) for:
 - 1) Diesel
 - 2) Motor fuel (gasoline)
 - 3) Ethanol/gasohol
 - 4) Propane
 - 5) “Other fuel types”

The report also includes listings for any penalties or credits to be applied. After calculating the various liabilities and credits, a balance due or refund request is submitted. If a balance is due, the form instructs that the check or money order should be made payable to the Kentucky State Treasurer.

Included with the IFTA-100 form is the IFTA-101 form—a separate form for reporting IFTA related data by jurisdiction. This form is a more specific work sheet that, once calculated, provides the required totals for the IFTA-100.

¹⁵ Following text was drawn from KYTC Division of Motor Carriers web site. See <http://www.kytc.state.ky.us/motorcarriers/IFTA.HTM>

On the IFTA-101 form, the company is again required to submit its name and IFTA identification number. The form then requires the company to plug totals into the following formula, which determines the average fleet miles per gallon:

$$\text{Total IFTA Miles} + \text{Total Non-IFTA Miles} = \text{Total Miles} / \text{Total Gallons} = \text{Average Fleet MPG}$$

The form then requires that the company submit:

- 1) the IFTA jurisdictions in which it has operated
- 2) the IFTA miles within that jurisdiction
- 3) the taxable miles (which should be equal to the IFTA miles with the jurisdiction)
- 4) the fleet miles per gallon,
- 5) the taxable gallons of fuel consumed within a jurisdiction,
- 6) the tax paid gallons of fuel purchased within that jurisdiction
- 7) the tax rate within that jurisdiction
- 8) the tax (or credit) due
- 9) any interest due and
- 10) the total (tax or credit) due

An authorized signature—whether the taxpayer or preparer—is required at the bottom of the sheet along with a date, address and phone number. The signatory “(certifies) that this business is duly licensed and that this report, including any schedules, is to the best of (their) knowledge and belief true, correct and complete.”

Instructions indicate that checks or money orders should be made payable to the Kentucky State Treasurer. Mailing instructions are not included on the main report.

It is worthwhile to point out that these reports—IFTA 100 and IFTA 101—require fleet totals. They do not require companies to report by individual carrier. So, if a company owns more than one truck, its report will reflect the total miles traveled within IFTA jurisdictions by the entire fleet. Consequently, there is no distinction between IFTA miles traveled by a truck with a registered weight of 26,000 pounds or one that is registered at 59,999 pounds.

- ◆ **KIT:** The Kentucky Intrastate Tax Form is the intrastate equivalent to IFTA. This report requires Kentucky companies that do not travel outside of state lines to report mileage and fuel consumption for vehicles having a combined gross weight or licensed weight in excess of 26,000 pounds—excluding farm vehicles.

The top of the form requires companies to submit their business name, business address and KIT number.

Under section one (“Miles/Fuel Consumption”), companies are required to report:

- 1) Total miles operated in Kentucky (by vehicles defined above)
- 2) Total gallons consumed in Kentucky
- 3) Average Miles per gallon (Line 1 divided by Line 2)

- 4) Taxable miles operated on Kentucky public highways
- 5) Taxable gallons of fuel consumed on Kentucky public highways.

Under section two (“Tax Computation”), companies are required to report and compute:

- 1) Tax paid on gasoline purchased in KY
- 2) Tax paid on special fuel purchased in KY
- 3) Tax (or credit) due
- 4) Credits from previous quarter(s)
- 5) Net tax due
- 6) Penalties and interest due
- 7) Total Liability

The form requires a signature, date and telephone number. The signature demonstrates that the signatory “declares under penalty of perjury that this report is true, correct, and complete to the best of (their) knowledge and belief.” If money is due, checks are to be made payable to the Kentucky State Treasurer and mailed to the Division of Motor Carriers in Frankfort.

- ◆ **KYU:** The KYU form is the required form for companies operating with a KYU number to submit their Kentucky weight-distance liability.

The form requires companies to submit their business name, business address and KYU number.

The report then requires companies to report their Kentucky miles, which is then multiplied by \$0.0285. If any penalties apply due to late filing, they are reported as well. From those sums, the total amount due is calculated and reported.

The form requires a signature, date and telephone number. The signature demonstrates that the signatory “declares under penalty of perjury that this report is true, correct, and complete to the best of (their) knowledge and belief.”

If money is due, checks are to be made payable to the Kentucky State Treasurer and mailed to the Division of Motor Carriers in Frankfort.

- ◆ **Electronic Reporting and Filing:** All of these reports can be completed and submitted through the Department of Transportation Division of Motor Carrier’s web site. (See <http://www.kytc.state.ky.us/motorcarriers/Truckingtaxes.htm>).
- ◆ **Summary of Reports:** See page 21.

Table 4: Summary of Tax Reports

Data Submitted	Report Filed:		
	IFTA	KIT	KYU
Identification Number	Yes	Yes	Yes
Jurisdiction	Yes	n/a	n/a
Rate Code	Yes	n/a	n/a
IFTA Miles	Yes	n/a	n/a
Taxable Miles	Yes	Yes	Yes
Taxable Miles by Jurisdiction	Yes	n/a	n/a
Total Gallons Consumed	Yes	Yes	n/a
Miles Per Gallon	Yes	Yes	n/a
Taxable Gallons	Yes	Yes	n/a
Tax Paid Gallons	Yes	Yes	n/a
Net Taxable Gallons	Yes	n/a	n/a
Tax Rate	Yes	n/a	n/a
Tax Due	Yes	Yes	n/a
Credit Due	Yes	Yes	n/a
Total Due	Yes	Yes	Yes

Source: Table was developed by the authors of this report through an examination of the various tax reporting forms described previously in this chapter.

Analysis of Carrier Tax Reporting

Kentucky utilizes three distinct reports to capture tax data for three categories of vehicles:

- 1) Interstate carriers exceeding 26,000 pounds (IFTA)
- 2) Intrastate carriers exceeding 26,000 pounds (KIT)
- 3) Interstate and Intrastate carriers exceeding 59,999 pounds (KYU)

While these reports are distinct, the vehicle categories are not. There is overlap between them. There are interstate carriers and intrastate carriers that exceed both 26,000 pounds and 59,999 pounds. So, a logical question would be, does Kentucky need all of these reports? Are they redundant? Can the state discontinue one or more and still capture the necessary data required for tax collection and enforcement? The answer is probably not.

As alluded to earlier, IFTA reports submit company-wide vehicle miles. There is no distinction between a truck that weighs 26,000 pounds and one that weighs 59,999 pounds. So, IFTA data does not provide a mechanism for determining weight-distance liability. As a matter of fact, the heavy-vehicle fuel surtax was repealed on July 15, 1996 as IFTA was implemented statewide. There is simply no device for determining liabilities that are specific to registered weights other than the general 26,000+ category nor could a device be devised by the Commonwealth of Kentucky alone. The international nature of the agreement requires consensus among its members to

implement any substantial changes. Since only four IFTA members utilize the weight-distance tax, it is difficult to imagine that any change that would benefit Kentucky could be agreed upon.

Similarly, KIT data does not provide a distinction between carrier weights. Theoretically and with the proper legislation, KIT could require its carriers to submit their mileage information for each individual vehicle. That information could be used to determine weight-distance liability for those intrastate vehicles that exceed 59,999 pounds. However, there is a possibility—if not a likelihood—that carrier companies would simply apply for an IFTA license in order to avoid the additional paperwork. An IFTA license can be justified by only one interstate trip per year.

As a result, the authors of this report cannot recommend that these reports and applications be utilized nor can it foresee them being utilized in the future to estimate carrier tax liabilities.

Chapter 4

Calculating Heavy Carrier’s Tax Liabilities, Proposed Revisions and Alternatives

To this point, this report has been critical of the current models utilized to estimate the weight distance tax and fuel surtax liabilities—focusing primarily on the proportional distributions of registered weights calculated from accident data—while also concluding that the reports reporting a company’s IFTA and KIT liabilities are insufficient to create an abstract model to calculate the weight-distance liability.

The purpose of this chapter is to propose potential alternative modeling techniques that may serve as a robust methodology of determining the weight-distance liability. It is important to note that due to the constraints of time and resources, following recommendations have not been tested empirically. These alternatives are offered as models to be considered and tested with the appropriate data and within a relevant context, i.e. a comparative review of current and proposed methodologies. It should also be noted that these alternative models are not offered as wholesale replacements of the current models. Instead, they should be considered as models that can be used in conjunction with the current methodology with each providing a “check” on the other. If both methods prove to provide similar estimates, then the results should be received with a high level of confidence. If they provide different results, then the interested parties should target additional time and resources toward reconciling the methods and developing a robust estimating tool.

Before moving on to the alternatives, there is a need to discuss a system used by the KYTC Division of Planning to determine traffic counts.

Automatic Traffic Recorder (ATR)

The ATR system is a system of data collection that provides a vast sum of data to the KYTC Division of Planning. The ATR system currently has eighty (80) permanent stations located within the state with at least one placed on each functional class of road. The goal is to eventually have at least five permanent stations located on each functional class of road.

Along with the permanent stations, the KYTC also has the capability of conducting mobile counts (“tube counts”) virtually anywhere in the state. This combined capacity allows for the collection of hundreds of thousands of data points that relate to traffic on Kentucky’s roadways.

Axle configurations and “actual” vehicle weights are among the data collected through the ATR system. Axle configurations are determined by axle spacing and reported in by “vehicle type.” There are thirteen vehicle type classifications.

Weights are determined through a “weight-in-motion” calculation. Currently, thirty (30) of the permanent ATR sites capture “weight-in-motion” data. Portable equipment is also utilized to capture “weight-in-motion” data on roads not served by permanent ATR sites. Combined, the permanent and mobile stations provide weight samples for each functional class of road in Kentucky.

Although the ATR system captures “actual” weight data, it has been suggested that an examination of actual weight data in conjunction with axle configurations would allow for inferential assumptions to be made regarding “registered” weights. For example, it was suggested that if the ATR system captures a data point that indicates a carrier is a five-axle vehicle and has an “actual” weight of 30,000+ pounds, an assumption can be made that this vehicle is really an unloaded semi-carrier that should be “registered” at 80,000 pounds. If this is true and can be verified, it is safe to propose that other assumptions can be made utilizing axle configurations and actual weight data to provide a statistically sound frequency distribution of carriers’ registered weights on Kentucky highways.

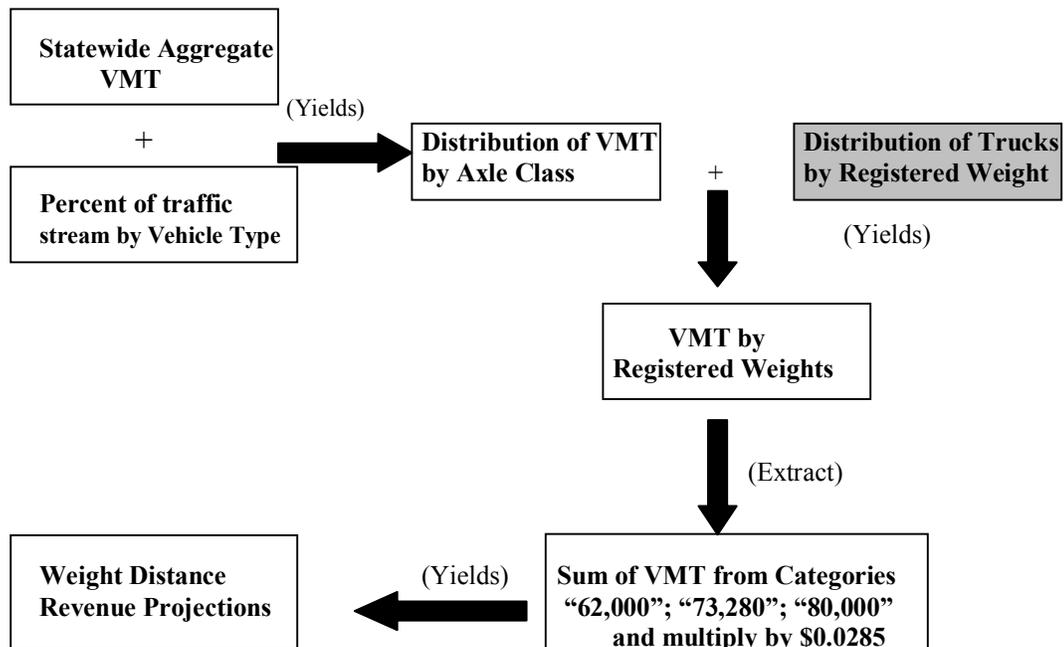
As a result, the distribution could be determined through a sampling process that captures actual active data on Kentucky’s roadways, overcoming the issue of using Kentucky-only data captured from accident data. If proven effective, this method could provide a more representative sample of the true carrier population on the road.

The ATR system is sanctioned and governed by guidelines established by the FHWA. The data is compiled quarterly by the Division of Planning and reported yearly to the FHWA.

The Weight-Distance Tax Model with Revised Weight Distributions

As discussed earlier (chapter 2) the current model is:

Figure 4: Estimating Weight-Distance Revenues--Revised



Source: Kentucky Transportation Center

The criticism for the current model was reserved exclusively for the methodology utilized to determine the distribution of registered weights by axle class. The focus of the criticism was the utilization of accident data and its inability to provide a representative sample of the true carrier population on Kentucky highways. The sample lacked

credibility due to the fact that it is wholly reliant upon carriers registered in Kentucky, missing the significant contribution to the traffic stream on Kentucky highways by out-of-state carriers.

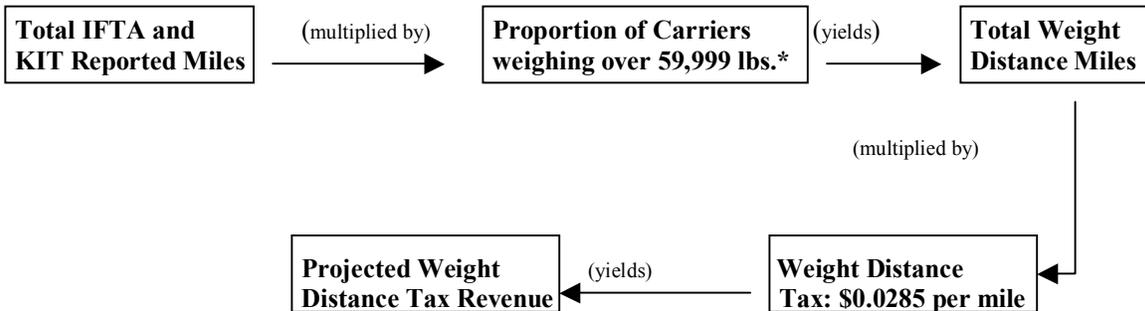
The ATR system discussed earlier seems to provide data that could replace this incomplete data set. Through analysis of the ATR data, a frequency distribution of registered weights and axle configuration that is a closer representation of the actual population could theoretically be determined and applied to the current model, providing a robust abstract methodology for distributing VMT by registered weights.

If this adaptation is adopted, each of the vital components of data utilized to compute that distribution will be collected under methods sanctioned by the FHWA, furnishing a final calculation for the weight-distance calculation that should be received with a reasonably high level of confidence.

Alternative Model: Utilizing IFTA & KIT Data to Calculate Weight-Distance Liabilities

Although Chapter 3 of this report concluded that individually filed IFTA and KIT reports were insufficient to determine weight-distance liabilities, aggregate IFTA and KIT mileage may provide the foundation of an alternative model for estimating the weight-distance liability. The alternative model would be:

Figure 5: Alternative Projection Model for the Weight-Distance Tax



*See below

Source: This figure was developed by the authors of this report with vital input from representatives at the KYTC.

Utilizing IFTA and KIT reported data, statewide aggregate vehicle miles related to carrier travel of those carriers exceeding 26,000 pounds could be determined.

Next, employing the ATR system, a distribution of those trucks that weigh over 26,000 pounds *and* over 59,999 pounds could be calculated. The desired population would not be all carriers on Kentucky highways. This model would only be interested in determining what proportion of trucks that report IFTA and KIT data—those over 26,000 pounds—also should report weight-distance data.

Once that has been accomplished, that proportion of trucks weighing over could then be multiplied by the total number of IFTA and KIT reported miles to determine the total number of miles associated with those trucks.

Once that total has been calculated, it would be multiplied by \$0.0285—the weight distance tax rate—to estimate the total weight distance tax liability.

Critique of the Proposed Model

There are two potential criticisms of this model:

- ◆ First, the most basic data in which the model is built upon is self-reported miles. In chapter 2 of this report, it was suggested that abstract modeling is attractive as a “check” upon self-reported data—a technique that allows for potential evasion through underreporting.

This report suggests that this may not be as significant of a problem as one might expect with other self-reporting data sets. This suggestion is made primarily for two reasons:

- 1) IFTA is an agreement that has garnered the support of the 48 contiguous states of the United States and the provinces of Canada. An agreement that generates such broad support demonstrates the seriousness of the participants.
 - 2) There are significant penalties within IFTA that provide strong incentives for compliance by carrier companies.
- ◆ The second potential criticism is the relation of IFTA/KIT reported miles to the proportion of trucks weighing over 59,999 pounds on Kentucky roads. By simply determining the proportion of those trucks on Kentucky highways, one cannot assume mileage associated with any particular truck. That is, even though the ATR system captures a data point that determines a truck’s weight, it does not allow for any real inference about that truck’s activity—in terms of mileage—on Kentucky’s roads.

An example may bring this criticism into greater focus. Assume that a Kentucky company owns two trucks that run on Kentucky’s highways. Assume that the first one, weighing 26,000 pounds, runs a daily route from Lexington to Frankfort. Assume that the second one, weighing 60,000 pounds, runs from Lexington to Louisville. Both travel on I-64 to complete their routes, passing over an ATR “weigh-in-motion” sensor once each day. When recording their KIT data for the day, the company will record (estimate) 70 miles for the 26,000-pound carrier and 120 miles for the 60,000-pound carrier. Their daily total equals 190 miles.

Their impact upon the frequency distribution of truck weights upon Kentucky highways is a 50-50 split. Applying that frequency distribution to the company’s reported KIT mileage—based upon the proposed model—would suggest that the weight-distance liability is 85 miles. ($190 \times 0.5 = 85$). Clearly, this methodology

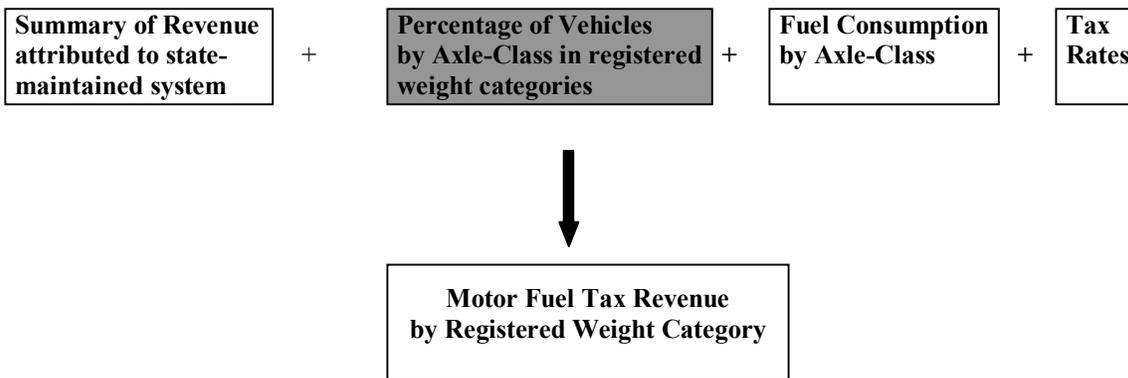
would underestimate the weight-distance liability since the true liability is closer to 120 miles. Conversely, if the trucks switched routes—the 26,000-pound truck took the Louisville route and the 60,000-pound truck took the Frankfort route—this methodology would overestimate the weight-distance liability.

For that reason, applying this frequency distribution to aggregate IFTA/KIT reported miles may provide some interesting insights but the model’s projections should not be accepted without some legitimate suspicion.

The Carrier Surtax Model with Revised Weight Distributions

As discussed earlier (chapter 2) the current model for estimating the carrier surtax liability is:

Figure 6: Estimating the Diesel Fuel Surtax--Revised



Source: Kentucky Transportation Center

As with the criticism of the current model employed to estimate the weight-distance liability, the questions surrounding this methodology arise from the utilization of accident data to determine the frequency distribution of carrier traffic on Kentucky’s roadways. As has already been suggested, the ATR system may provide a more robust method of determining that frequency distribution. If that is the case and can be verified, this report suggests plugging those new distributions into the current model as a means of calculating the carrier surtax projections.

Areas for Additional Research

As this report has made clear, due to the constraints of time and resources, these suggested revisions and proposed models have not undergone empirical scrutiny. They have merely been presented in the context of a critical inquiry into the current methodology employed to calculate the weight-distance liability and should not be accepted as immediate viable alternatives without additional study.

In addition, since this report has covered a wide-variety of topics and discussed a substantial amount of issues, the authors believe that it is appropriate to make some “other” suggestions for additional study, even though they may not immediately relate to the weight-distance and heavy carrier surtax issues.

- ◆ Conduct a “Review of Proposed Methodologies” study to determine whether or not the data provided from the ATR system will supply a viable frequency distribution of carrier weights on Kentucky’s highways. A consultative effort between the KTC and KYTC would almost assuredly lead to a quick and conclusive conclusion regarding this matter.
- ◆ If the ATR system’s data is determined to provide a sufficient database for determining the frequency distribution of registered weights, apply those “revised” distributions to the current weight-distance model and re-run the numbers. Compare the “revised” calculations against the calculations of the current model.
- ◆ If the current and proposed methodologies provide similar results, this report suggests accepting those results with a high level of confidence and utilizing both methods in future Cost Allocation Studies. If the current and proposed models produce significantly different results, then this report suggests further research of the methods with an eye on developing a robust methodology that will provide a reliable frequency distribution of registered weights on Kentucky’s highways.
- ◆ If the ATR frequency distribution is determined to be robust, consider a statistical study to establish whether the current configuration of permanent ATR sites are placed throughout the state in a manner such that the sample data provides a representative sample of the intended population—carrier traffic on Kentucky’s roadways.
- ◆ Consider linking fuel tax reporting with corporate tax returns, which include corporate expense reports.

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Appendix
Carrier Applications and Tax Report Forms